

ABSTRACT

Influence of new customized cast dowel designs on the fracture resistance of endodontically treated maxillary central incisors -an *in vitro* study

AIM AND OBJECTIVE:

The purpose of this *in vitro* study was to evaluate the influence of new customized cast dowel designs on the fracture resistance of endodontically treated maxillary central incisors

MATERIALS AND METHODS

Sixty recently extracted maxillary central incisor with uniform root lengths were selected and stored in distilled water at a temperature of 37° C. Access cavity was prepared in all the teeth. Canal instrumentation was done to master apical file size #40 and step back preparation was done with periodic irrigation. Each canal was obturated by cold lateral condensation using gutta-percha points and resin sealer (AH Plus). 60 teeth were divided into 6 groups of 10 teeth each (group A, B, C, D, E, F). Group A is the control group which did not receive any post endodontic restoration.

The experimental groups received customized cast dowels with different designs- Group B- parallel dowel with no modifications, Group C- parallel dowel with uniform serrations, Group D- parallel dowel with non uniform serrations, Group E- parallel dowel with uniform serrations and stabilizing end, Group F- parallel dowel with non uniform serrations and stabilizing end. The coronal aspects of the teeth of the experimental groups [B,C,D,E,F] were removed at 2mm above the CEJ to make 2mm ferrule. The finish lines for all specimens were placed at the level of the CEJ. Samples were embedded in acrylic resin. Post space preparation was done in groups B, C,

D, E, and F. In groups E,F, the apical 3mm of the post space preparation was prepared using a custom drill (made with tapering end) to obtain a stabilizing end. Wax patterns were sprued, invested, and cast in a Ni-Cr alloy.

Design modifications were done on the posts in groups B, C, D, E, and F and luted. Metal crown was fabricated and luted with zinc phosphate cement. Specimens were subjected to loading in the universal testing machine at an angle of 45° to the long axis of tooth. A crosshead speed of 0.5 mm/min was applied until each sample fractured. The load at which failure occurred was measured in Newton (N). The data were analyzed with a one-way analysis of variance (ANOVA) to determine the differences among the mean values of the test groups and Tukey multiple comparison test was used to determine which test groups were statistically different from the others.

RESULTS:

The results of this study showed that the highest fracture resistance was seen in the group E (uniformly serrated parallel dowel with stabilizing end) and the lowest fracture resistance was seen in the group restored with parallel dowel (group B) other than the control group A. Intergroup comparison revealed that the custom made post fabricated had no significant difference in whichever technique and preparation done.

CONCLUSION:

Parallel sided dowels with serration and stabilizing ends showed high fracture resistance among the groups

Key words: Cast post ,serrations, stabilizing ends, dowel designs, fracture resistance